

# PATENT ABSTRACTS OF JAPAN

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## (54) MOBILE DATA COMMUNICATION SYSTEM

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide a service on a computer network transparently to a mobile terminal via a mobile communication network (e.g. a PDC network adopting a line exchange system) without losing the portability of the mobile terminal.

SOLUTION: The system is provided with a server in a LAN adopting the TCP/IP, a mobile terminal PS that is contained in a mobile communication network (e.g. a PDC network) of a line exchange system adopting a mobile communication protocol (e.g. a communication protocol provided with a WORM- ARQ function) where a load imposed on layers below a network layer is reduced more than a load imposed on the TCP/IP processing, an external port 2 for connection of the mobile terminal PS via the mobile communication network MN, and an internal port 1 to be connected to the LAN, and a communication protocol conversion means 4 that provides a new IP address to the external port 2 to mutually convert the communication protocol of data sent/received between the external port 2 and the internal port 1.



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**CLAIMS**

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[Claim(s)]

[Claim 1] Mobile data communication system characterized by providing the following. The server in the computer network which adopted the 1st communications protocol which equipped a meaning with the address system of an identifiable network layer for the component The migration terminal unit held in the mobil radio communication network of the circuit switching mode which adopted the 2nd communications protocol reduced rather than the burden by which the burden placed on processing of the layer below a network layer is placed on processing of the layer below the network layer in said 1st communications protocol The communications protocol conversion means which carries out the interconversion of the communications protocol of the data which are equipped with the internal port for connecting the external port and said computer network for connecting said migration terminal unit through said mobil radio communication network, give the address which followed said address system to said external port, and are sent and received between said external ports and said internal ports

[Claim 2] Said protocol conversion means is mobile data communication system according to claim 1 characterized by carrying out termination only of the communications protocol of the layer below a network layer.

[Claim 3] Said 2nd communications protocol is mobile data communication system according to claim 1 characterized by including a WORM-ARQ function.

[Claim 4] Said 1st communications protocol is mobile data communication system according to claim 1 characterized by being TCP/IP.

[Claim 5] Said mobil radio communication network is mobile data communication system according to claim 1 characterized by connecting with said external port through a fixed public network.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]**

[0001]

[Field of the Invention] This invention relates to mobile data communication system for the migration terminal unit held in the mobil radio communication network of a circuit switching mode to communicate with the computer in a computer network through the mobil radio communication network concerned.

[0002]

[Description of the Prior Art] The portable telephone equipped with the data card connector for connecting an external terminal among the common portable telephones equipped with the PDC (Personal Digital Cellular) function makes possible data communication in WORM-ARQ (Automatic Repeat Request). GBN (Go-Back-N) which will go back before the N frame in a transmitting side, and will resume transmitting processing if WORM-ARQ receives NACK (negative acknowledge) from a receiving side -- with law It is the automatic-request-for-repetition approach which combined law. SR (Selective-Repeat) which resends only the frame which received NACK and returns to transmitting processing of the newest frame -- In the mobile data communication link which adopted this approach, ARQ which usually followed the SR method is performed and ARQ according to the GBN method is performed under the inferior environment where a transmitting frame cannot be managed by the SR method.

[0003] The external terminal (for example, computer) connected to the portable telephone which made possible data communication in such WORM-ARQ, and the portable telephone concerned is used. When accessing the center which can offer the service on TCP/IP (Transmission Control Protocol/Internet Protocol), such as an electronic mail and WWW (World Wide Web), an external terminal first With a portable telephone, a circuit is connected to the dial-up router in the center connected to the public network, and a PPP (Pointto Point Protocol:RFC1171) connection is established between dial-up routers on it. Thereby, an IP address is given to an external terminal. Henceforth, an external terminal will communicate between centers using the given IP address.

[0004]

[Problem(s) to be Solved by the Invention] The numerousness of the hardware resources needed since an external terminal needs to mount PPP and TCP/IP conventionally and these communications protocols are mounted so that clearly from having mentioned above had become the cause which causes an increment and the formation of an expensive rank of the size of an external terminal, weight, and power consumption. If an external terminal lacks in portability especially, since the advantage of mobile computing "data communication is possible anywhere" will be spoiled, the present condition is giving up offer of service on TCP/IP by some application.

[0005] Moreover, in recent years, a portable telephone and an external terminal are unified and to give the client function of an electronic mail or WWW service to this unified migration terminal unit is tried. When PPP and TCP/IP are mounted in such a migration terminal unit, even the portability not only at the time of data communication but the time of a message will be spoiled.

[0006] It aims at offering the mobile data communication system which can offer the service on a computer network to a migration terminal transparent through a mobil radio communication network (for example, PDC network of a circuit switching mode), without succeeding in this invention in view of the situation mentioned above, and spoiling the portability of a migration terminal unit.

[0007]

[Means for Solving the Problem] In order to solve the technical problem mentioned above, mobile data communication system according to claim 1 The server in the computer network which adopted the 1st communications protocol which equipped a meaning with the address system of an identifiable network

layer for the component, The migration terminal unit held in the mobil radio communication network of the circuit switching mode which adopted the 2nd communications protocol reduced rather than the burden by which the burden placed on processing of the layer below a network layer is placed on processing of the layer below the network layer in said 1st communications protocol, It has an internal port for connecting the external port and said computer network for connecting said migration terminal unit through said mobil radio communication network. It is characterized by providing the communications protocol conversion means which carries out the interconversion of the communications protocol of the data which give the address which followed said address system to said external port, and are sent and received between said external ports and said internal ports.

[0008] According to this configuration, in order that a communications protocol conversion means may carry out the interconversion of the 1st communications protocol and 2nd communications protocol, the burden placed on processing of the layer below a network layer becomes available about the service on the 2nd communications protocol in the migration terminal unit which adopted the 2nd communications protocol reduced rather than the burden placed on processing of the layer below the network layer in said 1st communications protocol.

[0009] Moreover, in the above-mentioned configuration, said protocol conversion means may be made to carry out termination only of the communications protocol of the layer below a network layer, and (claim 2) It may be made for said 2nd communications protocol to include a WORM-ARQ function, and it is good also considering said 1st communications protocol as TCP/IP (claim 3), and said mobil radio communication network may be made to be connected to said external port through a fixed public network (claim 4) (claim 5).

[0010]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing. In addition, this invention is not limited to this operation gestalt, but modification various by within the limits of the technical thought is possible for it.

[0011] A: The configuration A-1 of an operation gestalt : the whole block diagram 1 is a conceptual diagram showing the configuration of the mobile data communication system by 1 operation gestalt of this invention.

[0012] In this drawing, the communication network of the circuit switching mode with which PS holds a migration terminal unit and NW holds the migration terminal unit PS concerned, and CP are the centers connected to the communication network NW, and offer the service on TCP/IP, such as an electronic mail and WWW.

[0013] In a communication network NW, MN is the mobil radio communication network which enabled the communication link with the migration communications protocol which connoted WORM-ARQ, and holds the migration terminal unit PS directly. Moreover, PN is a public network (PSTN) and the mobil radio communication network MN and Center CP are connected through the public network PN. In the node of a mobil radio communication network MN and a public network PN, the public correspondence protocol (for example, RFC standard V.42) which is a communications protocol on the public network PN equivalent to the above-mentioned migration communications protocol, and the above-mentioned migration communications protocol are changed mutually.

[0014] In the migration terminal unit PS, MS is a portable telephone held in a mobil radio communication network MN, and is enabling the communication link with the above-mentioned migration communications protocol. In addition, in this operation gestalt, the network and telephone which were based on PDC which is enabling the communication link by WORM-ARQ as a mobil radio communication network MN and portable telephones MS are assumed.

[0015] Moreover, in the migration terminal unit PS, TE is the external terminal connected to the portable telephone MS, and communicates with Center CP through a portable telephone MS and a communication network NW. The external terminal TE has the function to process the HTML data described by HTML (Hyper Text Markup Language), and the function which carries out termination of the HTTP (Hyper Text Transfer Protocol) which is a communications protocol for transmitting and receiving the HTML data concerned. However, the migration terminal unit PS thinks portability as important, is designed, and is not equipped with the function which carries out termination of PPP or the TCP/IP.

[0016] LAN (Local Area Network) which adopted TCP/IP as a communications protocol is laid by Center CP, and the server which provides this LAN with the various above-mentioned services is connected. In drawing 1, only the HTTP server HS which distributes the HTML data demanded from the client by HTTP is illustrated.

[0017] Moreover, the dial-up router DUR is connected to the LAN concerned. This dial-up router DUR is connected to the public network PN. A dial-up router is equipment which gave the dial-up connect function to the router which carries out routing of the network packet by the network layer, and spread through it widely. A different point from a well-known dial-up router among the functions which a dial-up router DUR has is explained in full detail below.

[0018] A-2: The functional diagram 2 of a dial-up router DUR is drawing showing the functional configuration of a dial-up router DUR. Hereafter, although the function of a dial-up router DUR is explained based on this drawing, that explanation and illustration are omitted about the function of the well-known dial-up router DUR. Moreover, since the hardware configuration of a dial-up router DUR is the same as that of a well-known dial-up router, the explanation is omitted.

[0019] In a dial-up router DUR, the internal port where 1 was connected to LAN in Center CP, the external port where, as for 2, the subscriber line of a public network PN was connected, a routing means for 3 to carry out routing of the data from an internal port 1 side or the external port 2 side, and to send out to an external port 2 or internal port 1 side, and 4 are the communications protocol conversion means inserted between the external port 2 and the routing means 3, and the interconversion of a public correspondence protocol and TCP/IP is performed.

[0020] 5 is a call control means, performs processing which establishes the circuit of a public network PN at the time of the call in to the external port 2, and supplies the signal showing that to the communications protocol conversion means 4 at the time of circuit establishment. Moreover, the call control means 5 performs processing which cuts the circuit of a public network PN according to the call clear-down directions from a public network PN side.

[0021] The communications protocol conversion means 4 will give an IP address to the external port 2, if the signal of the purport which the circuit established from the above-mentioned call control means 5 is received. Specifically, the communications protocol conversion means 4 is supplied to the routing means 3 while it generates the new IP address which followed the system of the IP address in LAN in Center CP ignited by reception of the above-mentioned signal and holds it as an IP address of the external port 2.

[0022] thereby -- the routing means 3 -- the destination IP address of an internal port 1 to an IP packet -- the above -- when in agreement with a new IP address, routing of this IP packet can be carried out to the external port 2 side. in addition, the communications protocol conversion means 4 can receive all IP addresses in use from the routing means 3 in LAN in Center CP, and does not overlap these IP addresses -- as -- the above -- it has opted for a new IP address.

[0023] Moreover, in transform processing of a communications protocol, if the input data (TCP segment in a migration communications protocol) from the external port 2 is received, in the case of the data for which this input data needs assignment of a destination IP address, the communications protocol conversion means 4 will opt for a destination IP address, and it will perform transform processing of a communications protocol so that the destination IP address concerned may be included in the data after conversion of a communications protocol (TCP segment in TCP/IP). In addition, in explanation of the actuation mentioned later, the communication link of the data which do not need assignment of a destination IP address is illustrated.

[0024] Moreover, in transform processing of a communications protocol, the communications protocol conversion means 4 receives the input data (TCP segment in a migration communications protocol) from the external port 2, specifies the port number (port number in a TCP segment) according to this input data, and performs transform processing of a communications protocol based on this port number. Moreover, the communications protocol conversion means 4 receives the input data (TCP segment in TCP/IP) from an internal port 1, specifies the port number according to this input data, and performs transform processing of a communications protocol based on this port number. In addition, in explanation of the actuation mentioned later, actuation in case the port number is beforehand set as "HTTP" is illustrated.

[0025] That is, transform processing of the communications protocol in the communications protocol conversion means 4 is performed using the IP address and port number (and destination IP address) which were given to the external port 2.

[0026] B: Drawing 3 of an operation gestalt of operation is drawing showing the example of protocol structure of this operation gestalt, and explains actuation of this operation gestalt with reference to this drawing. In addition, a port number is fixed to HTTP and the protocol structure shown in drawing 3 shows the configuration under a situation with unnecessary assignment of a destination IP address. Moreover, it is as having mentioned above about the actuation at the time of a line connection, and in order to avoid duplication, the explanation is omitted here.

[0027] If the request of HTTP is transmitted to the HTTP server HS from the migration terminal unit TE as shown in this drawing, in the migration terminal unit TE, the request concerned will be encapsulated and it will become data of a migration communications protocol (WORM-ARQ). This capsulation is performed between the external terminal TE and a portable telephone MS. In this way, the changed data of a migration communications protocol are transmitted to a mobil radio communication network MN, and protocol conversion is performed to them between a mobil radio communication network MN and a public network PN, and they turn into data of V.42.

[0028] The data of V.42 are transmitted to the dial-up router DUR of Center CP through a public network PN. In a dial-up router DUR, the data of V.42 are changed into the packet of TCP/IP by the protocol conversion means 4. It is received by the HTTP server HS, and the packet of this TCP/IP is reverse-encapsulated here, and returns to the request of HTTP.

[0029] The HTTP server HS returns the response to the above-mentioned request. That is, the HTML data specified by the above-mentioned request are returned as a response of HTTP. The process which the response of HTTP follows is the process and reverse order which the request of HTTP mentioned above followed, and since it is clear also from drawing, it omits the explanation. In addition, the HTML data supplied, Response HS, i.e., the HTTP server, of HTTP finally obtained in the migration terminal unit PS, are processed by the external terminal TE.

[0030] Thus, according to this operation gestalt, the service which the HTTP server HS on LAN as which the burden placed on processing as compared with TCP/IP adopted TCP/IP in the migration terminal unit TE which adopted the light migration communications protocol offers can be received.

[0031] C: Although processing which requires a dial-up router DUR for conversion of a communications protocol is performed in the mobile data communication system mentioned above modification 1, as shown in drawing 4, the router control unit CU is connected to a dial-up router DUR, and it may be made to perform the above-mentioned processing in the router control unit CU concerned. In addition, the router control unit CU is equipped with ROM (Read Only Memory) which stored the program of operation, CPU (central processing unit) which reads and performs the program concerned of operation, and RAM (Random Access Memory) used by the CPU concerned, and each part cooperates and it performs the above-mentioned processing. Moreover, the router control device CU is made to take charge only of functions, such as grant of the IP address to the external port 2, grant of a destination IP address, and assignment of a port number, and you may make it make the communications protocol conversion means 4 of a dial-up router DUR take charge only of transform processing of data.

[0032] D: In a modification 2 and the mobile data communication system mentioned above, although the public network PN is inserted between the mobil radio communication network MN and Center CP, as long as correspondence in the direct connection with a mobil radio communication network MN is possible for a dial-up router DUR, as shown in drawing 5, Center CP may be directly connected with a mobil radio communication network MN. In this case, the communications protocol conversion means of a dial-up router DUR will perform processing which changes a migration communications protocol and TCP/IP mutually.

[0033] E: It cannot be overemphasized that this invention is not limited to PDC although it assumed that the mobil radio communication network MN and the portable telephone MS were based on PDC corresponding to WORM-ARQ in the operation gestalt and modification which are a supplement and which were mentioned above. Moreover, in the operation gestalt and modification which were mentioned above, although the migration terminal unit PS was constituted combining the external terminal TE and the portable telephone MS, it cannot be overemphasized that both may be unified and the migration terminal unit PS may be constituted. Furthermore, although the computer network in Center CP was set to LAN, it cannot be overemphasized that you may be wide area networks, such as the Internet.

[0034]

[Effect of the Invention] Since a communications protocol conversion means carries out the interconversion of the 1st communications protocol and 2nd communications protocol according to this invention as explained above, a migration terminal unit only adopts the 2nd communications protocol reduced rather than the burden by which the burden placed on processing of the layer below a network layer is placed on processing of the layer below the network layer in said 1st communications protocol, and can receive the service on the 2nd communications protocol. That is, the service on a computer network can be offered to a migration terminal through a mobil radio communication network (for example, PDC network of a circuit switching mode) transparent, without spoiling the portability of a migration terminal unit.

[0035] Especially, in the case of TCP/IP whose 1st communications protocol of the above is a standard

communications protocol in a computer network, in a migration terminal unit, various services can be received transparent, reducing the load concerning processing of a communications protocol. Moreover, in the case of the communications protocol with which the 2nd communications protocol of the above includes a WORM-ARQ function, in a migration terminal unit, an above-mentioned advantage is enjoyable, securing communicative dependability.

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to mobile data communication system for the migration terminal unit held in the mobil radio communication network of a circuit switching mode to communicate with the computer in a computer network through the mobil radio communication network concerned.

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PRIOR ART

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[Description of the Prior Art] The portable telephone equipped with the data card connector for connecting an external terminal among the common portable telephones equipped with the PDC (Personal Digital Cellular) function makes possible data communication in WORM-ARQ (Automatic Repeat Request). GBN (Go-Back-N) which will go back before the N frame in a transmitting side, and will resume transmitting processing if WORM-ARQ receives NACK (negative acknowledge) from a receiving side -- SR (Selective-Repeat) which resends only law and the frame which received NACK and returns to transmitting processing of the newest frame -- it is the automatic-request-for-repetition approach which combined law. In the mobile data communication link which adopted this approach, ARQ which usually followed the SR method is performed and ARQ according to the GBN method is performed under the inferior environment where a transmitting frame cannot be managed by the SR method.

[0003] When accessing the center which can offer the service on TCP/IP (Transmission Control Protocol/Internet Protocol), such as an electronic mail and WWW (World Wide Web), using the external terminal (for example, computer) connected to the portable telephone which made possible data communication in such WORM-ARQ, and the portable telephone concerned, an external terminal is a portable telephone first. A circuit is connected to the dial-up router in the center connected to the public network, and a PPP (Pointto Point Protocol:RFC1171) connection is established between dial-up routers on it. Thereby, an IP address is given to an external terminal. Henceforth, an external terminal will communicate between centers using the given IP address.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] Since a communications protocol conversion means carries out the interconversion of the 1st communications protocol and 2nd communications protocol according to this invention as explained above, a migration terminal unit only adopts the 2nd communications protocol reduced rather than the burden by which the burden placed on processing of the layer below a network layer is placed on processing of the layer below the network layer in said 1st communications protocol, and can receive the service on the 2nd communications protocol. That is, the service on a computer network can be offered to a migration terminal through a mobil radio communication network (for example, PDC network of a circuit switching mode) transparent, without spoiling the portability of a migration terminal unit.

[0035] Especially, in the case of TCP/IP whose 1st communications protocol of the above is a standard communications protocol in a computer network, in a migration terminal unit, various services can be received transparent, reducing the load concerning processing of a communications protocol. Moreover, in the case of the communications protocol with which the 2nd communications protocol of the above includes a WORM-ARQ function, in a migration terminal unit, an above-mentioned advantage is enjoyable, securing communicative dependability.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] The numerousness of the hardware resources needed since an external terminal needs to mount PPP and TCP/IP conventionally and these communications protocols are mounted so that clearly from having mentioned above had become the cause which causes an increment and the formation of an expensive rank of the size of an external terminal, weight, and power consumption. If an external terminal lacks in portability especially, since the advantage of mobile computing "data communication is possible anywhere" will be spoiled, the present condition is giving up offer of service on TCP/IP by some application.

[0005] Moreover, in recent years, a portable telephone and an external terminal are unified and to give the client function of an electronic mail or WWW service to this unified migration terminal unit is tried. When PPP and TCP/IP are mounted in such a migration terminal unit, even the portability not only at the time of data communication but the time of a message will be spoiled.

[0006] It aims at offering the mobile data communication system which can offer the service on a computer network to a migration terminal transparent through a mobil radio communication network (for example, PDC network of a circuit switching mode), without succeeding in this invention in view of the situation mentioned above, and spoiling the portability of a migration terminal unit.

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**MEANS**

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[Means for Solving the Problem] In order to solve the technical problem mentioned above, mobile data communication system according to claim 1 The server in the computer network which adopted the 1st communications protocol which equipped a meaning with the address system of an identifiable network layer for the component, The migration terminal unit held in the mobil radio communication network of the circuit switching mode which adopted the 2nd communications protocol reduced rather than the burden by which the burden placed on processing of the layer below a network layer is placed on processing of the layer below the network layer in said 1st communications protocol, It has an internal port for connecting the external port and said computer network for connecting said migration terminal unit through said mobil radio communication network. It is characterized by providing the communications protocol conversion means which carries out the interconversion of the communications protocol of the data which give the address which followed said address system to said external port, and are sent and received between said external ports and said internal ports.

[0008] According to this configuration, in order that a communications protocol conversion means may carry out the interconversion of the 1st communications protocol and 2nd communications protocol, the burden placed on processing of the layer below a network layer becomes available about the service on the 2nd communications protocol in the migration terminal unit which adopted the 2nd communications protocol reduced rather than the burden placed on processing of the layer below the network layer in said 1st communications protocol.

[0009] Moreover, in the above-mentioned configuration, said protocol conversion means may be made to carry out termination only of the communications protocol of the layer below a network layer, and (claim 2) It may be made for said 2nd communications protocol to include a WORM-ARQ function, and it is good also considering said 1st communications protocol as TCP/IP (claim 3), and said mobil radio communication network may be made to be connected to said external port through a fixed public network (claim 4) (claim 5).

[0010]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing. In addition, this invention is not limited to this operation gestalt, but modification various by within the limits of the technical thought is possible for it.

[0011] A: The configuration A-1 of an operation gestalt : the whole block diagram 1 is a conceptual diagram showing the configuration of the mobile data communication system by 1 operation gestalt of this invention.

[0012] In this drawing, the communication network of the circuit switching mode with which PS holds a migration terminal unit and NW holds the migration terminal unit PS concerned, and CP are the centers connected to the communication network NW, and offer the service on TCP/IP, such as an electronic mail and WWW.

[0013] In a communication network NW, MN is the mobil radio communication network which enabled the communication link with the migration communications protocol which connoted WORM-ARQ, and holds the migration terminal unit PS directly. Moreover, PN is a public network (PSTN) and the mobil radio communication network MN and Center CP are connected through the public network PN. In the node of a mobil radio communication network MN and a public network PN, the public correspondence protocol (for example, RFC standard V.42) which is a communications protocol on the public network PN equivalent to the above-mentioned migration communications protocol, and the above-mentioned migration communications protocol are changed mutually.

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network MN, and is enabling the communication link with the above-mentioned migration communications protocol. In addition, in this operation gestalt, the network and telephone which were based on PDC which is enabling the communication link by WORM-ARQ as a mobil radio communication network MN and portable telephones MS are assumed.

[0015] Moreover, in the migration terminal unit PS, TE is the external terminal connected to the portable telephone MS, and communicates with Center CP through a portable telephone MS and a communication network NW. The external terminal TE has the function to process the HTML data described by HTML (Hyper Text Markup Language), and the function which carries out termination of the HTTP (Hyper Text Transfer Protocol) which is a communications protocol for transmitting and receiving the HTML data concerned. However, the migration terminal unit PS thinks portability as important, is designed, and is not equipped with the function which carries out termination of PPP or the TCP/IP.

[0016] LAN (LocalArea Network) which adopted TCP/IP as a communications protocol is laid by Center CP, and the server which provides this LAN with the various above-mentioned services is connected. In drawing 1, only the HTTP server HS which distributes the HTML data demanded from the client by HTTP is illustrated.

[0017] Moreover, the dial-up router DUR is connected to the LAN concerned. This dial-up router DUR is connected to the public network PN. A dial-up router is equipment which gave the dial-up connect function to the router which carries out routing of the network packet by the network layer, and spread through it widely. A different point from a well-known dial-up router among the functions which a dial-up router DUR has is explained in full detail below.

[0018] A-2: The functional diagram 2 of a dial-up router DUR is drawing showing the functional configuration of a dial-up router DUR. Hereafter, although the function of a dial-up router DUR is explained based on this drawing, that explanation and illustration are omitted about the function of the well-known dial-up router DUR. Moreover, since the hardware configuration of a dial-up router DUR is the same as that of a well-known dial-up router, the explanation is omitted.

[0019] In a dial-up router DUR, the internal port where 1 was connected to LAN in Center CP, the external port where, as for 2, the subscriber line of a public network PN was connected, a routing means for 3 to carry out routing of the data from an internal port 1 side or the external port 2 side, and to send out to an external port 2 or internal port 1 side, and 4 are the communications protocol conversion means inserted between the external port 2 and the routing means 3, and the interconversion of a public correspondence protocol and TCP/IP is performed.

[0020] 5 is a call control means, performs processing which establishes the circuit of a public network PN at the time of the call in to the external port 2, and supplies the signal showing that to the communications protocol conversion means 4 at the time of circuit establishment. Moreover, the call control means 5 performs processing which cuts the circuit of a public network PN according to the call clear-down directions from a public network PN side.

[0021] The communications protocol conversion means 4 will give an IP address to the external port 2, if the signal of the purport which the circuit established from the above-mentioned call control means 5 is received. Specifically, the communications protocol conversion means 4 is supplied to the routing means 3 while it generates the new IP address which followed the system of the IP address in LAN in Center CP ignited by reception of the above-mentioned signal and holds it as an IP address of the external port 2.

[0022] thereby -- the routing means 3 -- the destination IP address of an internal port 1 to an IP packet -- the above -- when in agreement with a new IP address, routing of this IP packet can be carried out to the external port 2 side. in addition, the communications protocol conversion means 4 can receive all IP addresses in use from the routing means 3 in LAN in Center CP, and does not overlap these IP addresses -- as -- the above -- it has opted for a new IP address.

[0023] Moreover, in transform processing of a communications protocol, if the input data (TCP segment in a migration communications protocol) from the external port 2 is received, in the case of the data for which this input data needs assignment of a destination IP address, the communications protocol conversion means 4 will opt for a destination IP address, and it will perform transform processing of a communications protocol so that the destination IP address concerned may be included in the data after conversion of a communications protocol (TCP segment in TCP/IP). In addition, in explanation of the actuation mentioned later, the communication link of the data which do not need assignment of a destination IP address is illustrated.

[0024] Moreover, in transform processing of a communications protocol, the communications protocol conversion means 4 receives the input data (TCP segment in a migration communications protocol) from the

external port 2, specifies the port number (port number in a TCP segment) according to this input data, and performs transform processing of a communications protocol based on this port number. Moreover, the communications protocol conversion means 4 receives the input data (TCP segment in TCP/IP) from an internal port 1, specifies the port number according to this input data, and performs transform processing of a communications protocol based on this port number. In addition, in explanation of the actuation mentioned later, actuation in case the port number is beforehand set as "HTTP" is illustrated.

[0025] That is, transform processing of the communications protocol in the communications protocol conversion means 4 is performed using the IP address and port number (and destination IP address) which were given to the external port 2.

[0026] B: Drawing 3 of an operation gestalt of operation is drawing showing the example of protocol structure of this operation gestalt, and explains actuation of this operation gestalt with reference to this drawing. In addition, a port number is fixed to HTTP and the protocol structure shown in drawing 3 shows the configuration under a situation with unnecessary assignment of a destination IP address. Moreover, it is as having mentioned above about the actuation at the time of a line connection, and in order to avoid duplication, the explanation is omitted here.

[0027] If the request of HTTP is transmitted to the HTTP server HS from the migration terminal unit TE as shown in this drawing, in the migration terminal unit TE, the request concerned will be encapsulated and it will become data of a migration communications protocol (WORM-ARQ). This capsulation is performed between the external terminal TE and a portable telephone MS. In this way, the changed data of a migration communications protocol are transmitted to a mobil radio communication network MN, and protocol conversion is performed to them between a mobil radio communication network MN and a public network PN, and they turn into data of V.42.

[0028] The data of V.42 are transmitted to the dial-up router DUR of Center CP through a public network PN. In a dial-up router DUR, the data of V.42 are changed into the packet of TCP/IP by the protocol conversion means 4. It is received by the HTTP server HS, and the packet of this TCP/IP is reverse-encapsulated here, and returns to the request of HTTP.

[0029] The HTTP server HS returns the response to the above-mentioned request. That is, the HTML data specified by the above-mentioned request are returned as a response of HTTP. The process which the response of HTTP follows is the process and reverse order which the request of HTTP mentioned above followed, and since it is clear also from drawing, it omits the explanation. In addition, the HTML data supplied, Response HS, i.e., the HTTP server, of HTTP finally obtained in the migration terminal unit PS, are processed by the external terminal TE.

[0030] Thus, according to this operation gestalt, the service which the HTTP server HS on LAN as which the burden placed on processing as compared with TCP/IP adopted TCP/IP in the migration terminal unit TE which adopted the light migration communications protocol offers can be received.

[0031] C: Although processing which requires a dial-up router DUR for conversion of a communications protocol is performed in the mobile data communication system mentioned above modification 1, as shown in drawing 4, the router control unit CU is connected to a dial-up router DUR, and it may be made to perform the above-mentioned processing in the router control unit CU concerned. In addition, the router control unit CU is equipped with ROM (Read Only Memory) which stored the program of operation, CPU (central processing unit) which reads and performs the program concerned of operation, and RAM (Random Access Memory) used by the CPU concerned, and each part cooperates and it performs the above-mentioned processing. Moreover, the router control device CU is made to take charge only of functions, such as grant of the IP address to the external port 2, grant of a destination IP address, and assignment of a port number, and you may make it make the communications protocol conversion means 4 of a dial-up router DUR take charge only of transform processing of data.

[0032] D: In a modification 2 and the mobile data communication system mentioned above, although the public network PN is inserted between the mobil radio communication network MN and Center CP, as long as correspondence in the direct connection with a mobil radio communication network MN is possible for a dial-up router DUR, as shown in drawing 5, Center CP may be directly connected with a mobil radio communication network MN. In this case, the communications protocol conversion means of a dial-up router DUR will perform processing which changes a migration communications protocol and TCP/IP mutually.

[0033] E: It cannot be overemphasized that this invention is not limited to PDC although it assumed that the mobil radio communication network MN and the portable telephone MS were based on PDC corresponding to WORM-ARQ in the operation gestalt and modification which are a supplement and which were

mentioned above. Moreover, in the operation gestalt and modification which were mentioned above, although the migration terminal unit PS was constituted combining the external terminal TE and the portable telephone MS, it cannot be overemphasized that both may be unified and the migration terminal unit PS may be constituted. Furthermore, although the computer network in Center CP was set to LAN, it cannot be overemphasized that you may be wide area networks, such as the Internet.

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[Translation done.]



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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the conceptual diagram showing the configuration of the mobile data communication system by 1 operation gestalt of this invention.

[Drawing 2] It is drawing showing the functional configuration of the dial-up router DUR in this system.

[Drawing 3] It is drawing showing the example of protocol structure in this system.

[Drawing 4] It is the conceptual diagram showing the configuration of the modification 1 of this system.

[Drawing 5] It is the conceptual diagram showing the configuration of the modification 2 of this system.

[Description of Notations]

1 [ -- A communications protocol conversion means 5 / -- A call control means, CP / -- A center, DUR / -- A dial-up router, a HS--HTTP server, MS / -- A mobil radio communication network, MS / -- A portable telephone, NW / -- A communication network, PN / -- A public network, PS / -- A migration terminal unit, TE / -- External terminal ] -- An internal port, 2 -- An external port, 3 -- A routing means, 4

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[Translation done.]